## CLAIMS

- 1. A process for producing a vinyl polymer terminated with a group having a polymerizable carbon-carbon double bond in the presence of a stable free radical.
- 2. The process according to claim 1, wherein the group having the polymerizable carbon-carbon double bond in the vinyl polymer is represented by formula (1):

 $-OC(O)C(R^{1}) = CHR^{2}$  (1)

5

15

- 10 (wherein  $R^1$  and  $R^2$  are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms).
  - 3. The process according to claim 2, wherein in formula (1),  $R^1$  and  $R^2$  are the same or different and each represent hydrogen or a saturated or unsaturated hydrocarbon group having 1 to 10 carbon atoms.
  - 4. The process according to claim 2 or 3, wherein in formula (1),  $R^1$  and  $R^2$  are the same or different and each represent hydrogen, methyl, phenyl, or 1-propenyl.
- 20 5. The process according to any one of claims 1 to 4, wherein the vinyl polymer is a (meth)acrylic polymer.
  - 6. The process according to claim 5, wherein the vinyl polymer is an acrylic ester polymer.
- 7. The process according to any one of claims 1 to 4, 25 wherein the vinyl polymer is a styrene polymer.

- 8. The process according to any one of claims 1 to 7, wherein the vinyl polymer is produced by living radical polymerization.
- The process according to claim 8, wherein the living
   radical polymerization is atom transfer radical polymerization.
  - 10. The process according to claim 9, wherein the atom transfer radical polymerization is performed using a complex of a metal selected from the group consisting of copper, nickel, ruthenium, and iron.
  - 11. The process according to claim 10, wherein a copper complex is used.
  - 12. The process according to any one of claims 1 to 7, wherein the vinyl polymer is produced by polymerizing a vinyl monomer using a chain transfer agent.
  - 13. The process according to any one of claims 1 to 12, wherein the vinyl polymer is produced by reaction between a vinyl polymer having a terminal structure represented by formula (2):
- 20  $-CR^3R^4X$  (2)

10

15

(wherein R<sup>3</sup> and R<sup>4</sup> each represent a group bonded to an ethylenically unsaturated group of a vinyl monomer, and X represents chlorine, bromine, or iodine), and a compound represented by formula (3):

25  $M^{+-}OC(O)C(R^{1}) = CHR^{2}$  (3)

(wherein  $R^1$  and  $R^2$  are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms, and  $M^+$  represents an alkali metal or quaternary ammonium ion).

14. The process according to any one of claims 1 to 12, wherein the vinyl polymer is produced by reaction between a vinyl polymer terminated with a hydroxyl group and a compound represented by formula (4):

 $XC(0)C(R^{1}) = CHR^{2}$  (4)

- (wherein  $R^1$  and  $R^2$  are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms, and X represents chlorine, bromine, or a hydroxyl group).
- 15. The process according to any one of claims 1 to 12,
  15 wherein the vinyl polymer is produced by reaction between a
  vinyl polymer terminated with an isocyanate group and a
  compound represented by formula (5):

 $HO-R^5-OC(O)C(R^1)=CHR^2$  (5)

20

25

(wherein  $R^1$  and  $R^2$  are the same or different and each represent hydrogen or an organic group having 1 to 20 carbon atoms, and  $R^5$  represents a divalent organic group having 2 to 20 carbon atoms).

16. The process according to any one of claims 1 to 15, wherein the vinyl polymer has a number-average molecular weight of 2,000 or more.

- 17. The process according to any one of claims 1 to 16, wherein the vinyl polymer has a ratio (Mw/Mn) of a weight-average molecular weight (Mw) to a number-average molecular weight (Mn) of less than 1.8 according to gel permeation chromatographic measurement.
- 18. The process according to claim 1, comprising distilling off a solvent from a solution containing the vinyl polymer by heating under reduced pressure in the presence of the stable free radical.

5

10 19. The process according to claim 1, wherein the process is carried out under the condition in which the oxygen partial pressure is 10,000 Pa or less.